

# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)



REC'D 12 OCT 2005

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Applicant's or agent's file reference 47371	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/IT2003/000414	International filing date (day/month/year) 02.07.2003	Priority date (day/month/year) 02.07.2003
International Patent Classification (IPC) or both national classification and IPC D04H1/40		
Applicant A. CELLI NONWOVENS S.P.A et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.  
  
☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).  
  
 These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:
  - I ☒ Basis of the opinion
  - II ☐ Priority
  - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
  - IV ☐ Lack of unity of invention
  - V ☒ Reasoned statement under Rule 66.2(a)(II) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
  - VI ☐ Certain documents cited
  - VII ☐ Certain defects in the international application
  - VIII ☐ Certain observations on the international application

Date of submission of the demand  22.11.2004	Date of completion of this report  11.10.2005
Name and mailing address of the international preliminary examining authority:   European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer  Naeslund, P  Telephone No. +49 89 2399-8614  

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. **PCT/IT2003/000414**

**I. Basis of the report**

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, Pages**

1-7 as originally filed

**Claims, Numbers**

1-15 filed with telefax on 27.09.2005

**Drawings, Sheets**

1/4-4/4 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims	1-15
	No: Claims	NONE
Inventive step (IS)	Yes: Claims	1-15
	No: Claims	NONE
Industrial applicability (IA)	Yes: Claims	1-15
	No: Claims	NONE

2. Citations and explanations

**see separate sheet**

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement**

Reference is made to the following documents:

- D1: WO 99/54537 A (SOERENSEN ELMGAARD BIRGER) 28 October 1999 (1999-10-28)  
D2: US-A-5 471 712 (KROYER KARL K K) 5 December 1995 (1995-12-05)  
D3: WO 95/22656 A (KROYER K K K) 24 August 1995 (1995-08-24)

1. None of the cited documents D1 (see figures 1,2 and page 5, line 6-line 28), D2 (see figures 1 and 2; col. 4, line 15-line 21) and D3 (see figure 1 with corresponding parts in the description) describe a device for dry-forming a striped-shaped fibrous material comprising all essential features of claim 12.

A pervious forming wire, a forming head on a first side of said wire and a suction box on the opposite side of the said wire are well-known features of the prior art devices. In such devices the forming head is supplied with fibers in a gaseous (air) flow whereby the fibers are mixed by a plurality of rotors perpendicular to said flow.

The subject-matter of the aforementioned claim 12 can be seen to differ in essence from said prior art in that there is provided a mixing device arranged in a supply duct, which feeds the forming head, comprising two pairs of rotors arranged in sequence.

The skilled man confronted with the problem of improving the mixing of the fibers in a stream of a gaseous flow does not gather from D1, nor from documents D2 or D3 that the part which supplies the forming head could be provided with a mixing device; i.e. there is no teaching of the possibility of locating the mixing previous to the inlet, in a duct, in such a way that the fibers are uniformly distributed and lumps can be avoided, at an early stage of the forming operation. That arrangement of the device is nowhere hinted at in the cited art. Similar arguments apply to claims 1 and 13; the features of at least a first pair of rotors on the inlet side and a second pair of rotors on the outlet side, where said rotors are arranged perpendicular to said flow and

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equipped with radial elements, are not suggested.

Accordingly, the subject-matter of claims 1, 12 and 13 fulfils the requirements of Art. 33(2) and 33(3) PCT.

2. The dependent claims comprise additional features. Therefore these claims also meet the requirements of Art. 33(2) and 33(3) PCT.
3. For the assessment of the present claims on the question whether they are industrially applicable, no particular reasoning would appear necessary to give. The industrial application would appear to be evident (Art. 33(4) PCT).

Amended Claims

1. Device (9) for mixing fibers in a gaseous flow, comprising a duct (11) for suspending fibers in a gaseous flow, with an inlet (13) and an outlet (15) and, between said inlet and said outlet, at least a first pair of rotors (16, 17) on the inlet side and a second pair of rotors (18, 19) on the outlet side, said rotors being arranged perpendicular to said flow and equipped with radial elements (43).

2. Device according to Claim 1, wherein the rotors of each pair have axes of rotation parallel to each other.

3. Device according to Claim 1 or 2, in which the rotors of the various pairs have axes of rotation parallel to each other.

4. Device according to one or more of the preceding Claims, in which the rotors of the first pair rotate in opposite directions to each other and the rotors of the second pair rotate in opposite directions to each other.

5. Device according to Claim 4, in which the rotors (16, 17) of the first pair rotate so as to tend to produce a denser arrangement of the fibers in the passing flow toward the central zone of the duct (11), while the rotors (18, 19) of the second pair rotate so as to tend to produce a denser arrangement of the fibers in the passing flow toward the peripheral zone of the duct.

6. Device according to Claim 4, in which the rotors (16, 17) of the first pair rotate so as to tend to produce a denser arrangement of the fibers in the passing flow toward the peripheral zone of the duct (11), while the rotors (18, 19) of the second pair rotate so as to tend to produce a denser arrangement of the fibers in the passing flow toward the central zone of the duct.

7. Device according to one or more of the preceding claims, in which the radial elements (43) of said rotors comprise rod-shaped members constrained to a respective rotating shaft (41).

8. Device according to one or more of the preceding claims, in which said duct (11) has at least one portion with a rectangular or square cross-section, in which said rotors are inserted.

9. Device according to one or more of the preceding claims, in which said radial elements (43) have an extension such that the envelopes of adjacent rotors interfere with each other.

10. Device according to one or more of the preceding claims, in which said duct (11) has a transversal cross-section which is smaller than said inlet (13) and said outlet (15).

11. Device according to one or more of the preceding claims, in which said rotors are actuated at a variable speed.

12. A device for dry-forming a strip-shaped fibrous material, comprising a pervious forming wire (3), a forming head (5) on a first side of said wire and a suction box (7) on the opposite side of said wire, said forming head being supplied, by means of a supply duct (8), with fibers suspended in a gaseous flow, characterized in that a mixing device according to one or more of Claims 1 to 11 is arranged in said supply duct, upstream of said forming head (5).

13. Method for forming a strip-shaped fibrous article, comprising the steps of:

- supplying fibers suspended in a gaseous flow to a forming head (5) by means of a supply duct (8);
- depositing a layer of fibers by means of said forming head (5) onto a movable forming wire (3),

characterized by

- arranging in said supply duct at least a first pair of rotors (16, 17) and at least a second pair of rotors (18, 19), said first and second pair of rotors being arranged one following the other in the direction of the flow inside said supply duct;
- counter-rotating the rotors of each pair about axes perpendicular to the flow inside said duct,
- mixing said fibers in a gaseous suspension inside said supply duct by means of said rotors before feeding said fibers to said forming head .

14. Method according to Claim 13, characterized by producing a denser arrangement of fibers in the central zone of the duct and subsequently a denser arrangement of the fibers in the peripheral zone of

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the supply duct.

15. Method according to Claim 13, characterized by producing a denser arrangement of fibers in the peripheral zone of the duct and subsequently a denser arrangement of fibers in the central zone of the supply duct by means of said two pairs of rotors.
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